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ABSTRACT

To assess the relationship between paternal behavior and the intellectual functioning of preschool boys and girls, 180 white fathers from middle, working, and lower classes (as defined by the Hollingshead-Redlich Scale) were observed at home interacting with their 4-year-olds (99 boys and 81 girls). Sessions were tape-recorded. The number of father behaviors occurring in a 30-minute period were computed according to 25 pre-selected categories. The children were subsequently tested on the Stanford-Binet Intelligence Scale and on a set of standardized Piagetian tasks to assess their intellectual competence. Factor analysis of the 25 categories of father behaviors yielded 4 factors for father/son interactions and 6 factors for father/daughter interactions. Significant differences were found in the relationship between the behaviors of fathers in different social classes and the measures of their sons' cognitive functioning; but no such significant correlations were found between father behaviors and daughters' cognitive measures (although father's occupation became a significant predictor variable). Findings were discussed in terms of the child's sex role identification, and the observed differences in the behaviors fathers exhibited towards sons and daughters. (ED)

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OBSERVED PATERNAL BEHAVIOR AND THE INTELLECTUAL FUNCTIONING OF PRESCHOOL BOYS & GIRLS

by

Norma Radin and Ann Epstein

Paper presented at the meeting of the Society for Research in Child Development, Denver, Colorado, April 12, 1975

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Despite the importance attributed to fathers in the development of young children by a variety of theorists (Sears, 1953; Kagan, 1958; Mussen, Conger, and Kagan, 1963; Lynn, 1967; Biller, 1971) until the last few years there were relatively few natural observational studies of paternal behavior with preschoolers. Among the investigations which did include observations of fathers at home with young children were those by Baumrind (1971), Lytton (1973), and Fagot (1974). However, none of these studies involved lower class families. There is clearly a gap in the research literature.

There is no real disagreement among authorities in the field that fathers are critical in the socialization process. Blanchard and Biller (1971), McCord and McCord (1966), Grunebaum, Hurwitz, Prentice and Sperry (1962), Payne and Mussen (1965), Kagan (1958), Johnson (1963), Torgoff and Dreyer (1961), Dyk and Witkins (1965), Hetherington (1972), Pederson and Robson (1969), and Lynn (1974), as well as the previously cited researchers have emphasized the role fathers play in the development of sex-role identification, cognitive competence, and/or adaptive social behavior. Not readily available, however, is a reliable, inexpensive method for observing fathers interacting with their young children when other family members are not present to influence the behaviors, a method not dependent on observer's subjective assessments or post-observation recall. Above all, a tested methodology is needed which is acceptable to diverse social classes so that researchers will not be confined to investigating middle class families or university populations. A procedure used by the senior author in a pilot investigation of fathers and sons (Radin, 1972) appeared to meet these criteria but lacked a test of reliability, and a factor analysis of the observed behaviors, and also involved some deception. To overcome these defects and gather data about paternal interactions with daughters as well as sons, the study to be described below was conducted.

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An additional objective of the investigation was to determine the observable father behaviors associated with intellectual competence of preschool-aged boys and girls from lower-, working-, and middle-class intact families. Based on the theories of Sears (1953), Kagan (1958), Mussen, Conger, and Kagan (1963) and Payne and Mussen (1956), it was suggested that paternal warmth facilitates identification with the parent, or attempts to be like the father. These efforts may involve incorporating the father's values and ideas into the child's thinking, and imitation of the father's behaviors, including those related to problem solving and mastery of the environment. The identification process may therefore act as a stimulant to intellectual functioning in the preschool child. Although there is likely to be more imitation of the same-sex parent as Mussen et al (1961) and Kohlberg & Ziglor (1967), have pointed out, theories of identification (Sears, 1953; Kagan, 1958; and Gewirtz and Stengle, 1968), suggest that both boys and girls would tend to identify with a nurturant father. Further, there was no reason to believe that this phenomenon would not apply in diverse social classes. No attempt was made to assess identification by the child per se, as intensive studies such as that by Sears, Alpert, and Rau (1965) have found identification as a unitary construct virtually impossible to observe or measure. Radin's (1972) pilot investigation had used the IT Scale (Brown, 1956) in an attempt to tap father identification through sex role preference. However, no significant correlations were obtained between paternal behavior and IT Scale score. It was therefore concluded that the IT Scale was not useful for the desired purpose. Although some researchers (Hetherington and Frankie, 1967) have used imitation as a measure of identification, it was decided in this investigation to focus on the cognitive measures of the child, and on father behaviors, and to use identification only as a hypothetical explanatory variable.

There is theoretical justification for assuming that a second intervening

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variable in addition to identification links paternal warmth and child's intellectual competence. Piaget (1962) and Piagetian theorists (Furth, 1970; Kamii, 1971) have stressed the importance of exploration and acting on the environment in cognitive development of the young child. If the youngster perceives the environment as rewarding, he/she is likely to explore it further. It is not unreasonable to assume that the preschool child who has been frequently reinforced by an important part of the environment, that is, his/her father, will perceive the environment as gratifying. The child may then seek to interact with other aspects of the milieu in anticipation of finding them equally rewarding and responsive. Thus paternal warmth should foster motivation to master the environment (Veroff, 1965; Goldschmid , 1968). This motivation should in turn enhance cognitive functioning, in both boys and girls, and in all social classes.

Combining all of the above, the objectives of the study can be delineated as follows: 1) to develop more fully a methodology for observing fathers interacting with their preschool child under natural conditions at home when other family members are not present; 2) to test the hypotheses that there is a positive, significant correlation between observed paternal nurturance and cognitive measures of four-year-old boys and girls in the middle , working , and lower class, and that motivation to achieve is one mediating variable between observed paternal nurturance and the child's cognitive competence. Paternal restrictiveness was also explored, but no hypotheses were generated concerning this variable as it might be seen as a power-assertive technique which hinders the identification process (Hoffman, 1970) or as evidence of power in the object of identification and hence facilitative of identification (Kagan, 1958; Mussen and Distler, 1960). Pragmatic factors precluded conducting the entire study with both a black and white sample. The study was therefore confined to a white population to eliminate race as a contaminating variable.

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Method

One hundred and eighty white, intact families from seven cities in Michigan were studied. The names of 4-year-old subjects who would be eligible for kindergarten the following September were obtained from 12 elementary schools which had preschool programs or older siblings enrolled and information about younger children in the family. Letters were sent from the school principals, as well as from the senior author, inviting families to participate in a study of father-child relations. The father was subsequently telephoned by a male interviewer on our staff. If the father agreed to participate, an interview was scheduled. Almost 80% of the families contacted agreed to be part of the project, and most of those who refused said it was lack of time which prevented their participation as they held two jobs. Based on demographic data obtained during the interview, families were subsequently classified as middle-class, working-class, or lower-class. The Hollingshead (1957) Two Factor Index of Social Position was utilized to determine social class status on the basis of level of education attained and occupational status of both parents. There were no significant social class differences in the percentage of refusals. The final sample consisted of 37 middle-class boys, 28 middle-class girls, 39 working-class boys, 32 working-class girls, 23 lower-class boys, and 21 lower-class girls.

The interview was conducted in the subject's home. As requested in the phone call by the interviewer, only the father and the child were present in the room with the interviewer during this time. It was found that mothers were delighted to have a free evening. All verbal and nonverbal behaviors of the father toward his child were recorded with the father's permission. The father was given full information about the study as a pretest of 20 families had indicated that there were no significant differences in father behaviors when he was told or not told that his behaviors were being observed

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during the home visit. The verbal interactions were recorded on a Sony tape recorder and the nonverbal interactions were included in the notes taken by the interviewer during the session. Discussions with the father took between one and one and one-half hours. The interactions between the father and child taking place during the thirty minutes of the interview with the most father-child interactions were subsequently scored according to the 26 behavioral categories (Radin & Epstein, 1973). These included such behaviors as verbal reinforcement, fully meeting child's explicit needs, asking information of child, etc.*

The interview included the administration of the Cognitive Home Environment Scale (Radin & Sonquist, 1968)(CHES), a semi-structured questionnaire measuring the degree of cognitive stimulation in the home, and a shortened version of the Torgoff Parental Developmental Timetable (Torgoff, 1967; Stinson, 1972) which asks parental views about the appropriate age that children should master specific tasks and have freedom to engage in specific behaviors. Results of the CHES and Torgoff data are reported elsewhere (Epstein & Radin, 1975; Jordan, Radin & Epstein, in press). In addition, the interview contained a number of questions designed to elicit demographic data and supplemental information on fathers' child-rearing behaviors and attitudes. At the end of the interview, for exploratory purposes, the interviewer gave the child a number of puzzles of graduated difficulty to complete and told the father he could assist the child if he wished. The results of these findings are reported elsewhere (Radin & Epstein, 1975).

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*The other behavior categories were: consulting; ordering with explanation; preventive warning; bribing; psychological manipulation; preventive manipulation; correcting; partially meeting explicit needs; not meeting explicit needs; initiate conversation; stops talking to listen; continues talking; meeting other implicit needs; expressing affection; sharing; requesting; aversive ordering without explanation; non-aversive ordering without explanation; threatening; other aversive verbal behavior; aversive non-verbal behavior; physically stops the child.

To test the reliability of the observational data, a second interview was carried out with 20 fathers picked from all three classes, who agreed to participate in another interview within 1 month of the initial interview, with their son or daughter present. The mean frequencies of the 26 father behaviors on the first and second visits were compared using t-tests. No significant differences were found in behavioral frequencies.

Within a few weeks of the interview, families were re-contacted and appointments made to have their children participate in two individual testing sessions. Fathers had been told that this procedure would be followed. The testing sessions were generally held at the school where the children would be attending kindergarten. In the first session, a series of 8 Piagetian tasks developed by Rheta DeVries (1971) was administered. (Detailed instructions for scoring the tasks can be found in Radin & Epstein, 1973). In the second testing session, the Stanford-Binet Intelligence Scale was given. After the intelligence test was completed, but before an IQ was computed, the testers rated each child on the 13 items on the face sheet of the Binet booklet, e.g., desire to continue, challenged by tasks, using a four-point scale (Epstein & Radin, in press). The mean of these 13 ratings yielded a measure entitled Motivation to Achieve While Taking the Binet (Radin, 1971; 1974). Details of the findings concerning this rating are reported elsewhere (Epstein & Radin, 1975).

The above instruments were administered by trained testers. All were white and between 25 and 35 years of age. There were 2 men and 10 women. A different tester administered the instruments in each of the two sessions.

To determine the reliability of the scoring procedures for the observations, inter-rater reliability was computed using Cartwright's Alpha (1956), which yields the percentage of agreement between two scorers. Three researchers independently scored the protocols of between 10 and 20 subjects.

Reliability between the first and second coder averaged 88.9%; reliability between the second and third coder averaged 87.4%. Inter-rater reliability in scoring children's performance on the Piagetian tasks averaged 97.3%. In addition, a category system was devised (Radin & Epstein, 1973), based on DeVries' scoring procedures, for scoring the children's explanations of their choices or responses on the 8 tasks. For this measure, entitled Piaget Verbalizations, reliability averaged 95.3%.

The performance score consists of the average of the child's performance across all 8 tasks (conservation of length, of mass, of number, etc.). The Binet IQ scores were computed according to the new 1972 norms.

To determine the factorial structure underlying the observed father behaviors with children of each sex, the principal components were extracted and a varimax rotation was performed with the 26 father-child interaction categories. The Scree test (Cattell, 1966) was used as a guide to determine the number of factors to rotate to obtain the simplest factorial structure. Coefficients of congruence were computed between father-son behavior factors and father-daughter behavior factors and the methodology of Schneewind and Cattell (1970), used to determine the significant correlations among the factors. Since the method did not permit observing and coding child behaviors as the youngster either was too far from the microphone or did not articulate clearly, a measure related to the child's initiating interpersonal behaviors was computed by adding the frequencies of the five father-child categories where paternal behavior was clearly in response to the child's directing an activity specifically towards the father. The items included were (1) fully meeting explicit needs (2) partially meeting explicit needs (3) not meeting explicit needs, (4) stops to listen when child talks, and (5) continues talking when child talks. This measure was labelled "Child Initiates".

One-way analyses of variance were computed for each factor that emerged for each sex of child to determine if there were any social class effects on factor scores. In addition one-way analyses of variance were computed for each of the 26 behavior categories and for the variable "Child Initiates" to determine if there were significant sex differences. Two-way analyses were computed for the SB motivation score and the three cognitive measures to determine the impact of sex and social class on the scores. Pearson coefficients of correlation were computed between observed father factor scores for each sex and for the three cognitive measures: Stanford Binet IQ, Piaget Verbalization Score, and Piaget Mean Total Performance Score. Further, to predict the three cognitive measures for each sex and each social class subgroup, stepwise multiple regression equations were computed using Binet IQ, Piaget Verbalization Score and Piaget Mean Total Performance Score as the dependent variables and observed father behavior factors and demographic data as independent variables. (No regression equations were computed for social class as different father behavior factors emerged for each sex).

Finally, to determine if motivation to achieve was a mediating variable between observed father factors and cognitive measures, partial correlations were computed when a significant correlation was obtained between these variables, controlling the motivation factor.

Results

Table 1 presents the simplest factorial structure obtained when observed father behaviors with sons was factor analyzed. As can be seen from the table, 4 factors emerged which were labelled: (1) Positive Response to Child and Cognitive Stimulation (meeting the expressed needs of the child such as hunger, involving the child in the interview by asking him questions, and praising the child's behaviors); (2) Empathy and Psychological Manipulation (consulting with the child to determine his wishes, and meeting the unexpressed needs of the child, e.g. getting a pillow for the child who yawned and rubbed

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his eyes); (3) Preventive and Physical Control (warning the child beforehand not to do something or physically reacting to the child's actions in an aversive manner); (4) Verbal Restrictiveness (giving orders to the child in an aversive or non-aversive manner without explanations, threatening him, or directing other aversive statements to the child such as name-calling).

Table 2 presents the simplest factorial structure obtained when observed father behavior with daughters was factor analyzed. In the table appear the titles given to the 6 factors which emerged: (1) Meeting and Ignoring Explicit Needs (both meeting the expressed needs of the child, while at other times ignoring or refusing to meet these needs); (2) Aversive and Non-Aversive Control (structuring the environment to prevent unwanted behavior and providing an explanation whenever an order was given, but also threatening the child); (3) Verbal Restrictiveness and Requesting (giving orders without explanations to the child in an aversive or non-aversive manner, addressing other aversive statements to her, or requesting in a kind or neutral voice that the child do something for the father); (4) Empathy and Cognitive Stimulation (consulting, coaxing, meeting the child's implicit needs, and praising her behavior); (5) Attention to the Child's Verbalizations (correcting the child's errors, and stopping his own talking to listen to his daughter's conversations); (6) Physical Restrictiveness (physically reacting to the child's actions in either a neutral or an aversive manner).

It is noteworthy that while the first two factors found for boys can be regarded as nurturant and the other two factors as restrictive or controlling, only the last three factors for girls are clearly nurturant (#'s 4 and 5) or restrictive (#6). The first three factors of fathers' interactions with girls contains "mixed messages", in that they each combine both nurturant and supportive behaviors with restrictive and punitive elements. Only two significant coefficients of congruence were obtained out of 24 possibilities

when the 6 observed father behavior factors with girls were inter-correlated with the 4 observed father behavior factors with boys. The boys' factor Verbal Restrictiveness was significantly correlated with the girls' factor Verbal Restrictiveness and Requesting. In addition the boys' factor Empathy and Psychological Manipulation was significantly associated with the girls' factor Empathy and Cognitive Stimulation. Thus it appears that a fundamentally different factor structure underlies observed father behaviors with boys and girls.

In spite of the difference in factorial structure, the frequencies of only two of the 26 father-child behavior categories showed significant sex differences when one-way analyses of variance were performed. Partially Meeting Explicit Needs and Non-Aversive Ordering Without Explanation were significantly higher in boys than girls. Figure 1 presents the frequency of each of the behavior categories for boys and for girls.

In Table 3 are presented the results of the one-way analyses of variance for father factors examining social class effects. As can be seen in the table, lower-class families had significantly lower frequencies of Positive Response and Cognitive Stimulation when compared to middle- and working-class families. In addition, lower-class fathers displayed less Empathy and Psychological Manipulation towards sons than working-class fathers. For girls' father factors, the middle class was significantly higher than the working class on Meeting and Ignoring Explicit Needs while lower-class fathers showed more Attention to Child's Verbalizations than did fathers of working-class girls.

No significant sex or interaction effects emerged in the two-way analyses of variance performed on the three cognitive measures. IQ, Piaget Verbalization and Piaget MTP. There were significant social class effects in Binet IQ and Piaget Verbalization scores however. Post-hoc analyses indicated

that middle-class children scored significantly higher than lower-class children on Piaget Verbalizations and higher than both working-class and lower-class children on the Binet IQ. For mean Motivation While Taking the Binet, there were neither sex, social class, nor interaction effects. Insofar as the variable "Child Initiates" was concerned, boys scored significantly higher than girls.

Table 4 presents the significant correlations obtained between observed father behavior factors and cognitive measures for each sex and each sex-social class subgroup. As the table indicates, the boys' father factor Positive Reinforcement and Cognitive Stimulation was significantly correlated with IQ for all boys and for middle-class boys. This same factor was also significantly correlated with Piaget Verbalizations for all boys and middle-class and working-class boys. Boys' factor Preventive and Physical Control was negatively correlated with IQ in middle-class boys, while the factor Verbal Restrictiveness was negatively correlated with Piaget Mean Total Performance and Piaget Verbalizations for lower-class boys. No significant correlations were found between father factors and cognitive measures for girls as a whole or for middle-class or for working-class girls. One significant correlation was found between girls' father factor Meeting and Ignoring Explicit Needs, and Piaget Mean Total Performance in lower-class girls. However, as this was the only significant correlation among the 54 computed for the girls' subgroups, the significant association may have occurred by chance.

In Table 5 appear the results pertaining to the multiple regression equations. For boys as a whole, a significant multiple R was obtained when IQ and Piaget Verbalization were the dependent variables. The first and only significant variable to enter the equations in both cases was the father factor, Positive Response to the Child and Cognitive Stimulation.

None of the other predictor variables significantly increased the multiple R. For girls as a whole, a significant multiple R was obtained for all three cognitive measures. In each case, the first predictor variable was father's occupation. Again, the percent of explained variance, multiple R squared, was not significantly increased by any of the other predictor variables. For middle-class boys, Preventive and Physical Control with a negative relationship, and Positive Reinforcement and Cognitive Stimulation with a positive relationship, together accounted for 30% of the variance in Binet IQ. Further, for middle-class boys, Positive Reinforcement and Cognitive Stimulation with a positive association, and Empathy and Psychological Manipulation with a negative relationship together explained 25% of the variance in Piaget Verbalization scores. For lower-class girls, with Piaget MTP as the criterion variable, there were two significant predictors, both negatively related, Meeting and Ignoring Explicit Needs and Aversive and Non-Aversive Control. These two father behavior factors together with one suppressor variable (the factor Physical Restrictiveness) accounted for 49% of the variance in Piaget MTP results.

The results of the partial correlations appear in Table 6. For all boys, middle-class boys and working-class boys, motivational measures derived from the Binet face sheet acted as intervening variables in the positive relationship between boys' father factor Positive Reinforcement and Cognitive Stimulation, and the sons' cognitive competence. In addition, for middle-class and lower-class boys, Binet-derived motivational assessments mediated the negative correlations between intellective measures and boys' father factors, Preventive and Physical Control and Verbal Restrictiveness. The motivational measure did not intervene in the single significant correlation found for the subgroup of lower-class girls.

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Discussion

Insofar as the objective, the developing of a reliable, inexpensive methodology for observing father behavior under natural conditions is concerned, it appears to have been attained. The technique of observing fathers interacting with preschool children at home with no other family member present was found to be relatively inexpensive, acceptable to 3 social classes, and reliable in terms of collection of data and in coding of data. The procedure should be useful to those interested in father behavior as a dependent or independent variable, e.g., as a consequence of unemployment or a cause of child aggression. It should be noted that paternal interactions with preschool children would quite likely be different under different circumstances in the home. An analysis of observational data obtained at the end of the interview when the father was observing his child trying to complete a task indicated that there were low, although significant correlations with paternal behaviors during the interview when the child was not engaged in a mastery effort and the father was focused on the youngster (Radin & Epstein, 1975). Even more important, the correlational pattern between child cognitive measures and observed paternal behaviors when the child was completing a task was completely different than the pattern reported in this paper. Thus, although it can be said that a methodology has been developed for observing fathers at home interacting with preschoolers when other members of the family are not present, one cannot assume that this observational technique represents a sampling of all father behaviors under those circumstances. The problem of sampling is endemic to ethological techniques, as Lytton (1971) has pointed out. Thus in addition to the differential behavior observed in laboratory and home setting described by Lytton (1973), one must be aware that there is differential behavior within

the home given different conditions, even when the individuals present are held constant. However, to obtain information about paternal behavior when the father is distracted by other activities, a condition not atypical in the average home, it can be said that a reliable, easily implemented procedure has been developed in this investigation.

The hypotheses concerning significant relations between nurturant paternal behavior and child cognitive measures was supported, but only for boys, and for middle- and working-class boys. These findings are in keeping with those obtained in the pilot study for the project (Radin, 1972), and with results found by Pederson, Rubenstein, and Yarrow (1973). For boys as a group, and for each class subgroup of boys, there was at least one observed father behavior factor which correlated significantly with a cognitive measure. For middle-class boys, two significant factors were obtained which together accounted for almost one-third of the variance in the child's IQ. The usual social class indicators were essentially irrelevant in predicting boys' cognitive scores; it was paternal behavior that was more critical. It must be acknowledged that the causal direction may be reversed, as Bell (1968), and Osofsky & O'Connell (1972) have stressed; the children's cognitive ability may be eliciting specific types of paternal behaviors. It is also possible that a third variable is causing both father and child behavior and/or that the effect is circular with both father and son affecting one another's behavior. The question cannot be settled in a correlational study such as this. It does seem legitimate to hypothesize, however, that the father's behavior was having some influence on the child's cognitive competence.

Although father behavior can be said to be significantly associated with cognitive competence in four-year-old boys of all social classes, there were sharp differences in the type of paternal behavior which was

found to be important in the lower class as contrasted with the middle and working class. For the lower class, only the absence of verbal restrictiveness, fostered cognitive functioning. No set of behaviors enhanced cognitive performance. The fact that there was no significant difference in the amount of verbal restrictiveness present in the three classes highlights the unique pattern present in the lower class.

Perhaps the role played by paternal verbal restrictiveness can be better understood if examined in the light of the set of behaviors labelled Positive Response to Child and Cognitive Stimulation. For this factor, there were significant class differences in number of behaviors observed. As was found by Sears, Maccoby and Levin (1957), Kamii (1965), and in the pilot study (Radin, 1972), the lower class had significantly fewer behaviors of this type than either the middle or working class. This finding, combined with the positive association between these nurturant behaviors and cognitive measures in the middle-class and working class suggests that there may be a floor below which paternal nurturance has no effect. A certain minimum amount may be needed to influence cognitive functioning in the child or to influence the mediators between paternal behavior and cognitive competence of the preschooler. An alternate explanation is that other class-linked variables such as hunger, crowding, poor health and norms valuing physical prowess over intellectual pursuits may dilute the positive relationship between paternal warmth and the cognitive functioning of the young boy in lower-class families. Thus sufficient nurturance may be present but its effect may be counteracted in certain contexts. The data also suggest that the impact of restrictiveness may be affected by its context in which it is embedded. In the lower class where there is less positive responsiveness or nurturance for the four-year-old boy, restrictiveness may have a detrimental effect on the youngsters' intellectual functioning. In the middle and

working class where there is more paternal warmth and stimulation, an equal amount of restrictiveness may be innocuous.

The factor Positive Responsiveness and Cognitive Stimulation, which proved to be the most important set of paternal behaviors for boys' cognitive competence resembles the growth-producing factor obtained by Clarke-Stewart (1973), who observed lower and working-class mothers interacting with infants up to 18 months of age. The one factor Clarke-Stewart found to be most highly associated with competence in the child included expression of affection, contingent responsiveness, verbal stimulation, stimulation with objects, and acceptance of the child's behavior. Clarke-Stewart labelled this factor "Optimal Care". That label would have been appropriate in this study as well. Yarrow (1963) also found both maternal stimulation and affection were related to IQ in adopted infants. Another way of conceptualizing the factor Positive Response and Cognitive Stimulation is to perceive it as a combination of what Hoffman (1970) has referred to as induction, plus affection. The data from this investigation suggest it would be difficult to separate these paternal behaviors with four-year-old boys; warmth and intellectual stimulation seem to be inherently linked.

The hypothesis that motivation to achieve would mediate the relationship between paternal behavior and boys' cognitive measure in all social class was partially confirmed. Motivation, as assessed by behavior while taking the Stanford Binet, mediated the relationship between intellective scores and paternal responsiveness for all boys, and for working-class and middle-class boys. In all of the above instances, paternal nurturance enhanced the boys' motivation to achieve or master the task before him, and this enhanced motivation in turn enhanced his score. When the motivation factor was controlled, there was no longer any link between father and son

behaviors. Motivation also mediated the negative relationship between IQ and paternal controlling behavior in the middle class, and between Piaget MTP and paternal restrictiveness in the lower class. Here the linkage functioned somewhat differently. These paternal behaviors reduced the child's motivation, and this diminished motivation reduced the cognitive score. It appears that there is a type of mastery motivation which is responsive to father behavior and which affects the child's cognitive performance. There were, however, associations between paternal behavior and cognitive scores of sons not mediated by the mastery motivation factor. Thus is appears that motivation is only one mediator of the relationship between paternal behavior and intellectual functioning of the preschool boy. Possibly another relates to the degree of identification with the father, a variable not explored in this study.

The fact that the motivation measure employed in this study yielded meaningful data with all three cognitive scores, including two which were administered in a different week and by another examiner suggests that the items on the face sheet of the Binet may be a fruitful technique of tapping the child's adaptive responsiveness to tasks put before him. Motivation While Taking the Binet warrants further exploration with other age groups and other populations.

The hypothesis regarding the relationship between paternal behavior and the cognitive competence of four-year-old girls was essentially disconfirmed. There was only one significant association between an observed father factor and an intellective score for girls, and this may have well been due to chance factors. The regression equations did suggest that some paternal behaviors might affect the cognitive functioning but the presence of suppressor variables makes the relationship tenuous. For example, it was

only when one father factor was held constant in the middle class and working class, that any father factor became a significant predictor. The more outstanding finding emerging from the regression equation involving girls was that there was one significant predictor for all girls with all three cognitive measures and that was father's occupation. The higher the status of the occupation, the higher the girl's score. This finding tends to support Bayley and Schaefer's (1964) view that this may be a genetic factor influencing girls' intellective abilities which is not operative with boys. In this day of automatic promotions and pressures to stay in school, educational level may be less reflective of inherent ability than occupational level.

Whether or not a genetic factor is affecting girls more than boys, an examination of the factor structure undergirding observed father behavior with daughters sheds some light on the seeming disconnection between a father's behavior and his daughter's intellective functioning. Over half of the explained variance and 1/3 of the total variance in father behavior with girls was accounted for by mixed messages. For boys, all four factors reflected either clearly nurturant or clearly restrictive messages with the two restrictive factors being detrimental to the child's cognitive functioning and one of the nurturant factors appearing to be enhancing. For girls, the one restrictive factor did no harm; the two nurturant factors did not help cognitive development. Perhaps the ambivalent messages tended to alienate the girl from her father so that his other unambivalent behaviors neither helped nor hurt her. These findings are all the more provocative in view of the fact that only two of the individual 26 father behaviors coded showed significant sex differences. It was clearly the clustering that differed in father behavior with sons and daughters, not specific frequencies.

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The finding that there were virtually no predictors of girls' cognitive functioning except father occupation, a structural, non-explanatory variable, leads to speculation about other factors that might be having a positive influence on the young girls' functioning. There is ample evidence from the literature to suggest that four-year-old girls are using their mothers as the prime model. Radin's (1974) previous study of mothers, using a methodology similar to that employed in this investigation, indicated that maternal nurturance is associated with cognitive competence in preschool daughters but not in preschool sons. These findings dovetail with those obtained in the current study. Hetherington and Frankie (1967) found that nursery and kindergarten-aged girls imitated their mothers more than their fathers. Further, an investigation by Lynn and Cross (1974) indicated that 4-year-old girls preferred to play with their mothers, in contrast with 2 and 3-year-old girls who preferred their fathers. Lynn & Cross attributed this finding to pressure on 4-year-old girls to be concerned with their sex role but felt more research was needed to determine the underlying cause of this pressure. Perhaps the mixed message coming from fathers of these youngsters is a relevant factor.

Although mothers were not included in this investigation, there was indirect evidence from the data suggesting that the girls were indeed modeling their mothers and highly influenced by them. One of the factors on the Cognitive Home Environment Scale, the instrument administered during the interview, provided some clues. The factor was labelled Mother Stimulates (the other four factors obtained all pertained to fathers. They were Future Expectations for Child, Grades Expected, Father Stimulation, and Use of External Resources.) The three items with the highest loadings on the Mother Stimulates factor were Educational Gifts purchased, Craft Items in the Home, and Mother Assists the Child to Learn. When the Mother

Stimulates factor was correlated with Binet IQ of the child, one significant correlation was obtained; for middle-class girls there was a positive correlation of .47($p < .001$). For all other groups the correlation was below .19. Similarly there was only one significant correlation between Mother Stimulates and Piaget Verbalization: for lower-class girls there was a positive correlation of .46($p < .05$). For all other groups the correlation was below .21. Thus it appears that mothers are differentially enhancing the intellective growth of their daughters. Since there were no significant sex differences in the factor, it is unlikely that mothers are trying to stimulate daughters more than sons. Rather, the impact is different. Further, in only one subgroup was the factor Mother Stimulates significantly correlated with the variable Child Initiates. For middle-class girls the correlation was .46($p < .01$), suggesting that middle-class assertive girls may be modeling their initiating mothers. This interpretation would be in keeping with the Robinson and Robinson (1968) interpretation of the Fels study data where an inference was made that achieving girls identify with their accelerating, somewhat aggressive mothers.

Finally, when regression equations were computed using the cognitive measures as dependent variables and the father factors, demographic data, and Cognitive Home Environment factors as independent variables, the factor Mother Stimulates was a significant predictor for girls' groups, not for boys' groups. With Binet IQ as the dependent variable, Mother Stimulates was the first and only significant predictor for middle-class girls. With Piaget Verbalizations as the dependent variable, Mother Stimulates was the first significant predictor to emerge for lower-class girls and the only factor with a positive beta weight.

From the above discussion it appears that fathers have little influence

on their daughters except possibly through their ambivalent behavior to encourage the child to find another model with which to identify. However, a second CHES factor, Future Expectations, suggested that the father may influence his daughter indirectly, through his impact on his wife. Although virtually no father behavior was significantly associated with girls' intellective scores, fathers' expectations for the child correlated significantly with Binet IQ for all girls and with Binet IQ and Piaget Verbalizations for working-class girls. In addition, in the regression equations which included CHES factors, father behaviors and demographic data, Future Expectations was the only significant predictor of IQ for working-class girls, and the first significant predictor to emerge when Piaget Verbalization was the dependent variable. Thus it appears that paternal expectations, but not behaviors, affect their daughters' cognitive competence. Possibly, the father with high expectations for his daughter communicates this fact to his wife and she in turn modifies her behavior and becomes a more stimulating parent and model. Mothers may therefore serve as the mediator of paternal influence on four-year-old girls. Hetherington (1972) refers to the mother as the mediator of the effect of father absence on daughters' behavior with men. Hoffman (1970) describes the mother as the mediator of paternal power-assertiveness techniques. In this instance the maternal mediating effect is seen in a more positive light.

One issue which was not answered in this study was why fathers behave in an ambivalent way with their daughters and not their sons. Several hypotheses were tested and found unsupported. The possibility that fathers do not understand girls and do not know how to interact with them was tested by comparing the behavior factor scores of fathers of girls who had old

daughters with the scores of fathers of girls without older daughters. There were no significant differences. The variable Child Initiates did show sex differences with boys having higher scores, but it is not clear why less assertive behavior by girls should foster paternal ambivalence.

The only tentative explanation that did emerge from the data was that middle- and working-class fathers appeared to have ambivalent attitudes toward assertive initiating girls. For example, in the middle class, the CHES factor, Future Expectations, was negatively correlated with the father behavior factor Attention to the Child's Verbalization, whereas his future expectations for his daughter were not related to any cognitive measure. Thus, the girl who talks a good deal, regardless of her ability, was expected to have a limited future in the middle class. A similar picture emerged in the working class. Girls who made more explicit demands, or were more assertive, were also seen as having poor future prospects. This inference was made from the negative significant correlation obtained between the father behavior factor Meeting and Ignoring Explicit Needs and the CHES factor Future Expectations. In contrast, Meeting and Ignoring Explicit Needs was positively correlated with future expectations for girls in the lower class at the .001 probability level. Possibly in this socio-economic stratum where women often serve as the major breadwinner, assertiveness is not seen as damaging but rather enhancing of future prospects. In the other social classes, fathers may be conflicted about aggressive daughters, and view their future as dim. This interpretation of fathers' reactions to assertive girls is highly speculative, of course, but the issue warrants further investigation.

In sum, paternal nurturant behaviors were associated with, and perhaps facilitate 4-year-old boys' intellective functioning while restrictiveness

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behavior appears to hinder it. The child's motivation to master tasks is one of the intervening variables in both cases. Paternal behavior appears to have little impact on his daughters' cognitive functioning, possibly because much of his behavior with her contains a mixed message, and this strengthens her tendency to use her mother as her major model. Thus it appears that both the child's sex role and motivation mediate the relationship between paternal behavior and the cognitive functioning in 4-year-old children. The applicability of this conclusion to non-white and non-Anglo populations remains to be tested.

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TABLE 1

Varimax Factor Matrix: Father Behavior with Boys

Variable	Positive Response to Child & Cognitive Stimulation	Empathy & Psychological Manipulation of Child	Prevention & Physical Control of Child (Physical Restrictiveness)	Verbal Restrictiveness	h^2
Verbal Reinforcement	.77	-.09	-.04	-.14	.62
Consulting	-.03	.85	-.01	-.15	.74
Order with Explanation	.60	.07	.09	.25	.44
Preventive Warning	-.00	.02	.76	-.03	.58
Bribing	-.06	.78	.04	.41	.78
Psychological Manipulation	.27	.50	.02	.31	.42
Preventive Manipulation	-.16	-.01	.63	-.07	.42
Correcting	.56	-.12	.11	-.01	.34
Fully Meeting Explicit Needs	.73	-.10	.10	.22	.60
Partially Meeting Explicit Needs	.50	-.04	.33	.17	.39
Not Meeting Explicit Needs	-.02	-.22	.45	.54	.54
Initiates Conversation	.54	.08	-.18	.02	.33
Stops Talking	.67	.01	.10	-.24	.61
Continues Talking	.43	-.01	.22	-.13	.25
Meeting Other Implicit Needs	-.06	.88	.00	.09	.78
Affection	.47	.15	-.04	.08	.26
Sharing	.02	.11	-.04	.30	.11
Requesting	.00	.06	-.12	.24	.07
Asks Information	.47	.05	-.21	-.09	.28
Aversive Order without Explanation	-.04	-.14	.02	.56	.34
Non-Aversive Order without Explanation	-.03	.15	.17	.79	.67
Threatening	.01	.24	-.04	.64	.47
Other Aversive Verbal	.03	-.01	-.05	.52	.28
Aversive Non-Verbal	-.06	-.02	.85	.02	.73
Physically Stops	.27	.04	.48	-.07	.31
(Factor loadings)^2 by column	3.60	2.59	2.46	2.51	11.20
% Total Variance Explained	.14	.10	.10	.10	.45

TABLE 2

VARIMAX FACTOR MATRIX: FATHER BEHAVIOR WITH GIRLS

Variable	Meeting & Ignoring Explicit Needs	Aversive & Non-aversive Control	Verbal Restrictiveness & Requesting	Empathy, Psychological Manipulation & Cognitive Stimulation	Attention to Child's Verbalizations	Physical Restrictiveness	h^2
Verbal Reinforcement	.47	.16	-.11	.63	.24	.16	.74
Consulting	-.08	-.13	.22	.50	.03	-.15	.34
Order with Explanation	.06	.78	.14	-.13	.27	.04	.72
Preventive Warning	.17	-.02	.06	-.16	.48	.00	.29
Bribing	-.12	-.06	-.03	.03	-.05	.32	.13
Psychological Manipulation	.24	.48	-.04	.55	.00	.29	.67
Preventive Manipulation	-.13	.89	-.02	.01	-.08	-.19	.85
Correcting	.12	.02	.32	.16	.78	.08	.76
Fully Meeting Explicit Needs	.79	.02	.07	-.11	.28	.04	.72
Partially Meeting Explicit Needs	.56	.03	-.06	.16	.08	-.03	.35
Not Meeting Explicit Needs	.78	.03	.21	.02	-.17	-.05	.68
Initiates Conversation	.35	.08	.12	.67	.32	-.18	.73
Stops Talking	.06	.13	-.12	-.04	.75	-.16	.62
Continues Talking	.55	-.04	.09	.06	.31	.09	.42
Meeting Other Implicit Needs	-.04	-.06	.10	.75	-.08	.18	.61
Affection	-.07	-.12	-.11	.37	.46	-.05	.38
Sharing	.06	.05	-.10	.17	.61	.05	.42
Requesting	.46	-.05	.55	.32	-.11	-.14	.65
Asks Information	.13	.07	.43	.57	.04	-.22	.58
Aversive Order Without Explanation	-.04	.09	.91	.04	.03	-.12	.86
Non-Aversive Order without Explanation	.10	.10	.78	.23	-.09	.03	.69
Threatening	.09	.88	.16	.08	-.05	.24	.88
Other Aversive Verbal	.09	.08	.71	-.04	.10	.36	.66
Aversive Non-Verbal	.46	.26	.03	.35	.15	.67	.85
Physically Stops	.10	.13	.08	-.23	.04	.79	.72
(Factor Loadings)^2 by column	2.83	2.62	2.77	2.90	2.50	1.73	15:32
% Total Variance Explained	.11	.10	.11	.12	.10	.07	.61

TABLE 3

SIGNIFICANT CLASS DIFFERENCES IN OBSERVED FATHER BEHAVIOR FACTORS

Father Factor	1st Social Class Subgroup	Mean	SD	2nd Social Class Subgroup	Mean	SD	t
Positive Response to Child & Cognitive Stimulation	MC Boys	30.6	23.7	LC Boys	12.8	10.6	3.34**
	WC Boys	26.6	18.9	LC Boys	12.8	10.6	3.15**
Empathy & Psychological Manipulation	WC Boys	3.2	5.3	LC Boys	.9	1.2	2.09*
Attention to Child's Verbalizations	LC Girls	2.8	5.2	WC Girls	.7	1.1	2.16*
Meeting & Ignoring Explicit Needs	MC Girls	6.4	7.0	WC Girls	2.4	3.7	2.75*

Note: MC stands for middle class, WC for working class and LC for lower class.

** $p < .01$
* $p < .05$

TABLE 4

SIGNIFICANT CORRELATIONS BETWEEN OBSERVED FATHER BEHAVIOR FACTORS AND COGNITIVE MEASURES

Cognitive Measure	Sample	N	Father Behavior Factor	Correlation Coefficient
Binet IQ	All Boys	99	Positive Response to Child & Cognitive Stimulation	.25**
	MC Boys	37	" " "	.36*
	MC Boys	37	Preventive & Physical Control	-.41**
Piaget Verbalizations	All Boys	99	Positive Response to Child & Cognitive Stimulation	.38*
	MC Boys	37	" " "	.39*
	WC Boys	39	" " "	.39*
	LC Boys	23	Verbal Restrictiveness	-.45*
Piaget Mean Total Performance	LC Boys	23	Verbal Restrictiveness	-.41*
	LC Girls	21	Meeting & Ignoring Explicit Needs	-.50*

Note: MC stands for middle class, WC for working class, and LC for lower class.

** $p < .01$
* $p < .05$

TABLE 5

SIGNIFICANT PREDICTORS OF COGNITIVE MEASURES

IN STEPWISE MULTIPLE REGRESSION EQUATIONS

Dependent Variable	Subgroup	N	Significant Independent Variable	Sigh. of Variable	Sign	Multiple R	Percent of Var. Exp.
Binet IQ	All Boys	99	Positive Response & Cog. Stim	**	+	.255**	.06
	MC Boys	37	Preventive & Phys. Control	**	-	.411**	.17
			Positive Response & Cog. Stim.	*	+	.546**	.30
Piaget Mean Total Perf-ormance	MC Boys	37	Father's Occupation	*	+[a]	.329*	.11
	LC Boys	23	Verbal Restrict.	*	-	.410*	.17
Piaget Verb.	All Boys	99	Positive Response & Cog. Stim.	***	+	.331***	.14
	MC Boys	37	" "	*	+	.393*	.15
			Empathy & Psych. Manipulation	*	-	.499**	.25
	WC Boys	39	Positive Response & Cog. Stim.	**	+	.388**	.15
	LC Boys	23	Verbal Restrict.	*	-	.477*	.20
Binet IQ	All Girls	79	Father's Occupation	***	-[a]	.411***	.17
Piaget Mean Total Perf-ormance	All Girls	81	Father's Occupation	*	-[a]	.227*	.05
	LC Girls	21	Meeting & Ignoring Explicit Needs	*	-	.496*	.25
			Phys. Restrictiv.	b	+	.573*	.33
			Aversive & Non-Aversive Verbal	*	-	.696**	.49
Piaget Verbal.	All Girls	81	Father's Occupation	***	-[a]	.351***	.12
	MC Girls	28	Phys. Restrictive.	b	-	.330	.11
			Father's Occupation	*	-[a]	.505*	.26
			Aversive & Non-Aversive Verbal	*	-	.625**	.39
	WC Girls	32	Meeting & Ignoring Needs	b	-	.263	.07
			Attention to Verb.	*	+	.463*	.19

a) The higher the status of the occupation the lower the rating. The - sign indicates that the higher the status of the occupation, the higher the cognitive measures. A + sign indicates the lower the status, the higher the cognitive measures.

b) A suppressor variable which was not itself significant.

*** $p < .001$
** $p < .01$
* $p < .05$

TABLE 6

PARTIAL CORRELATIONS BETWEEN FATHER BEHAVIOR FACTORS AND CHILD'S COGNITIVE MEASURES WITH SB MOTIVATION CONTROLLED

Subgroup	N	Father Factor	Cognitive Measure	Initial Correlation	Partial Correlation	$z\sqrt{N-Y}$ (a)
All Boys	99	Pos. Response & Cog. Stim.	Binet IQ	.25**	.13	1.27
		" " " "	Piaget Verb.	.38***	.30	3.02**
MC Boys	37	" " " "	Binet IQ	.36*	.27	1.61
		" " " "	Piaget Verb.	.39*	.35	2.12*
		Prev. & Phys. Control	Binet IQ	-.41**	-.32	-1.89
WC Boys	39	Pos. Response & Cog. Stim.	Piaget Verb.	.39**	.29	1.78
LC Boys	23	Verbal Restrictiveness	Piaget Verb.	-.45*	-.47	-2.22*
		" "	Piaget MTP	-.41*	-.40	-1.83
LC Girls	20	Meeting & Ignoring Needs	Piaget MTP	-.59*	-.51	-2.24*

Note: MC stands for middle class, WC for working class, LC for lower class, and Piaget MTP for Piaget Mean Total Performance.

(a) Test for significance of a partial correlation (Hays, 1963)

*** $p < .001$
** $p < .01$
* $p < .05$

Mean Frequency of Father-Child Behaviors for Males (N = 99); Females (N = 81)

Figure 1